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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/068,273	02/07/2002	Aravind Padmanabhan	H19 02237 US	4265

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EXAMINER

VO. HAI

ART UNIT PAPER NUMBER

1771

DATE MAILED: 12/01/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/068,273	PADMANABHAN ET AL.	
	Examiner	Art Unit	
	Hai Vo	1771	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 10 September 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-49 is/are pending in the application.
- 4a) Of the above claim(s) 18-44 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17 and 45-49 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

1. It is noted that method claims 18, 35 and 36 in the listing of claims filed on 02/17/2004 are considered non-compliant because of their improper status identifiers. These claims should be identified as --currently amended/withdrawn--. Appropriate correction is required.
2. All of the art rejections are maintained.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.
4. Claims 1-12, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 200021905 in view of Gole et al (US 6,589,883) substantially as set forth in the 06/10/2004 Office Action. US 6,261,469 to Zakhidov et al is relied on as an equivalent form of WO 200021905.
5. Claims 13 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 200021905 in view of Gole et al (US 6,589,883) as applied to claim 1 above, further in view of Russell et al (US 6,093,941) substantially as set forth in the 06/10/2004 Office Action.
6. Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 200021905 in view of Gole et al (US 6,589,883) as applied to claim 1 above, further in view of Koops (US 6,064,506) substantially as set forth in the 06/10/2004 Office Action.

7. Claims 45, 46, 48 and 49 are rejected under 35 U.S.C. 103(a) as being unpatentable over WO 200021905 in view of Gole et al (US 6,589,883) and Jewell (US 5,617,445) substantially as set forth in the 06/10/2004 Office Action.
8. Claim 47 is rejected under 35 U.S.C. 103(a) as being unpatentable over WO 200021905 in view of Gole et al (US 6,589,883) and Jewell (US 5,617,445) as applied to claim 45 above, further in view of Koyama et al (US 6,462,356) substantially as set forth in the 06/10/2004 Office Action.

Response to Arguments

9. The art rejections have been maintained for the following reasons. Applicants argue that Zakhidov discloses a periodic microporous structural matrix of interconnecting, crystallographically oriented, monodispersed members, but Zakhidov does not disclose a superimposed surface nanoporosity. Gole shows a microporous structure with superimposed surface nanoporosity, but no periodic microporous structure. Applicants go on to state that there is no suggestion from the art that one should combined Zakhidov and Gole to superimpose surface nanoporosity on a periodic microporous structure. The examiner disagrees. Gole does not need to teach a periodic microporous structure because such feature is already taught by Zakhidov. Zakhidov discloses a photonic crystal comprising a three-dimensionally periodic microporous structural matrix of interconnecting, crystallographically oriented, monodispersed members having voids between adjacent members, and members having randomly nanoporous surface porosity (figure 9). The photonic crystal composed of 250 nm SiO₂ spheres (column 28,

lines 51-52). Zakhidov discloses the members comprise surfaces or interfaces that are inverse replicas of the surface of a monodispersed sphere array, wherein necks exist between neighboring spheres in the sphere array and the average sphere diameter is from 20 nm to 100 nm (column 4, lines 20-25). Zakhidov reads on the claim limitations (column 25, lines 18-27, and column 27, lines 65 et seq.) Zakhidov teaches the photonic crystal disposed on a surface of a silicon substrate (column 23, lines 21-24, column 25, line 20). Zakhidov discloses the article useful as a piezoelectric sensor (abstract). Zakhidov teaches the three dimensionally periodic photonic crystal having ability to bend light at curvatures for optical sensor applications (column 23, lines 50-55). Likewise, it is apparent that the three dimensionally periodic photonic crystal is light transmitting too. Zakhidov does not specifically teach the spheres comprising randomly nanoporous surface porosity. Gole, however, teaches a post etch treatment for enhancing and stabilizing the photoluminescence from a porous silicon (abstract). Gole also teaches the high surface area silicon formed through etching display a visible photoluminescence upon excitation with a variety of visible and ultraviolet light sources. Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to apply the etching treatment to the photonic crystal of Zakhidov motivated by the desire to stabilize and enhance the photoluminescence of the photonic crystals. This is important to the expectation of successfully practicing the invention of Zakhidov and thus suggesting the modification. In view of the teaching of Gole, one skill in the art would be motivated

to form the surface nanoporosity on the periodic microstructure of Zakhidov to stabilize and enhance the photoluminescence of the photonic crystals. The motivation to combine the two references is sufficient and strong enough to establish the *prima facie* case of obviousness. Additionally, Applicants argue the structure described by Applicants is structurally different than any structure described by Zakhidov because Zakhidov does not go further than discussing steps for the removal of the material A from an A-B composite structure. However, the structure of Zakhidov as modified by Gole is structurally the same as the structure as described by Applicants for the reasons set forth above. Further, Applicants argue that there is no suggestion from Zakhidov and Gole that photoluminescence in a periodic microporous structure would be enhanced by ten-fold over a conventional porous structure. The arguments are not commensurate in scope with the claims since nothing in the claims is specific about the photoluminescence enhanced by ten-fold as argued by Applicants. The examiner suggests that the photoluminescence properties should be incorporated in the claims and Applicants need to provide affidavit or evidence to demonstrate that such photoluminescence properties are technical advantage and unexpected results to one skilled in the art in order to overcome the finding of obviousness.

Conclusion

10. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Hai Vo whose telephone number is (571) 272-1485. The examiner can normally be reached on M,T,Th, F, 7:00-4:30 and on alternating Wednesdays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Terrel Morris can be reached on (571) 272-1478. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HV

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